

***Cistanthe philhershkovitziana* (Montiaceae): a remarkable annual species of
Cistanthe sect. *Cistanthe* from Chile**

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ABSTRACT

Cistanthe philhershkovitziana Hershk. (Montiaceae) here is described as the only fundamentally annual species of *Cistanthe* sect. *Cistanthe*, a taxon comprising ca. 12 species in Chile and two in Peru. *Cistanthe philhershkovitziana* is restricted to western Regions IV (Elqui and Limarí Provinces), V (Petorca Province), and Metropolitana (Chacabuco Province) of Chile. All other species are perennial (at least reportedly), although another is facultatively annual. Although uncommon in the southern portion of its range and appearing only in intermittent rainy years in the north, populations of the showy-flowered *C. philhershkovitziana* are conspicuous and distributed along well-travelled highways in populated coastal regions. Its oversight is remarkable and owes to historical inadequacy of the taxonomy of *C.* sect. *Cistanthe*. The origin of the annual life history presumably is derived in *C. philhershkovitziana*, but a caveat is that annuals are ancestral in certain closely related taxa. The species faces no immediate threat in Region IV, but the backdune habitat of the type locality in Region V is severely threatened by human encroachment. Published on-line www.phytologia.org *Phytologia* 100(4): 208-xxx (Dec 21, 2018). ISSN 030319430.

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As described in Hershkovitz (2018a), *Cistanthe* Spach sect. *Cistanthe* (Montiaceae, Cistantheae) comprises perhaps 12 species in Chile plus another two in Peru. Historically, the taxonomy of the Chilean species has been exceptionally inadequate. The plants never have been monographed, and the most recent revision of the Chilean species is Reiche (1898). Reiche formally recognized only a single species in Chile, *Calandrinia grandiflora* Lindley [= *Cistanthe grandiflora* (Lindley) Schltdl., *nom. cons.* (Veldkamp 2015, Applequist 2016)], which he described as polymorphic. But he also commented on the traits of other described species.

Reiche evidently based his treatment on Philippi's (1893a, b) preliminary studies and analysis of the relatively few herbarium specimens then available in Chile. Reiche's erroneous conclusion has influenced floristic and taxonomic works up to the present day. It also influenced my own thesis research (Hershkovitz 1990a, b, 1991a-c), which also based on studies of herbarium specimens.

But these succulent plants make poor herbarium specimens, because their diagnostic traits are not well-preserved, and the specimens tend to break up and disintegrate with time. Several species are distinguished easily in the field by morphology and locality. Eleven species are diagnosed in Chile by Hershkovitz (2018a), but probably there are at least two more.

One of the species recognized by Hershkovitz (2018a) was unnamed and here is named *Cistanthe philhershkovitziana* Hershk. It is remarkable, because it is a semelparous winter annual, whereas most species of the section are iteroparous perennial herbs and succulent shrubs. Whether any other species are truly annual is not certain. *Cistanthe grandiflora*, might behave facultatively as an annual in drought conditions, but otherwise it is very different from *C. philhershkovitziana*. The possibility that other species may be or behave as annuals is elaborated in the discussion below.

Hershkovitz (2006) erroneously identified specimens of *C. philhershkovitziana* as *C. grandiflora*, and, concomitantly, specimens of *C. grandiflora* erroneously as *C. discolor* (Schrad.) Spach. Based on my subsequently modified diagnosis, Villagrán et al. (2007) likewise described and illustrated *C. philhershkovitziana* as *C. grandiflora* and, concomitantly, *C. grandiflora* as *C. glauca* (Schrad.) Lilja. In fact, the last diagnosis is correct technically, but *C. grandiflora* subsequently was conserved against *C. glauca* (Veldkamp 2015, Applequist 2016).

My erroneous diagnosis of *C. philhershkovitziana* as *C. grandiflora* was a deduction inadequately researched. Diagnosis of the two sympatric species in Chile's Regions IV and V, *C. glauca* and *C. laxiflora* (Phil.) Peralta & D. I. Ford, was straightforward. The only name remaining for a type from this zone was *C. grandiflora*. I had not considered the possibility that *C. glauca* was taxonomically the same as *C. grandiflora*, and that *C. philhershkovitziana* had been overlooked altogether.

Although uncommon in Region V and appearing only in intermittent rainy years in Region IV, it is reasonably conspicuous. In fact, in rainy years, plants are visible along the shoulder of the Panamerican Highway in Region IV, Chile, even while driving at 120 km/h. With a range extending ca. 300 km along Chile's principal and well-traveled thoroughfares, how could such a distinctive and conspicuous species have been overlooked for more than a century? I attribute the oversight to Reiche's (1898) taxonomy, which fostered the assumption that all plants of *C. sect. Cistanthe* are *C. grandiflora*.

METHODS

The present plants were diagnosed on morphological evidence based on the taxonomic discussion of *C. sect. Cistanthe* in Hershkovitz (2018a). Plants were collected from the a single locality to replace earlier collections, which were destroyed following study. The locality was georeferenced previously using a GPS. The satellite view and map were generated using Google Maps.

RESULTS

A new species of *Cistanthe* sect. *Cistanthe* here is diagnosed and described.

Cistanthe philhershkovitziana Hershk. sp. nov. TYPE: Chile: Region V (Valparaiso), Petorca Province, La Ligua Municipality, Humedal de Pichicuy, restricted to sands on a ca. 3.5 ha backdune (ca. 70 x 500 m) featuring a rock outcrop projecting 4 m above the surface, 32.347S 71.444W, 8-10 m (Figs. 1, 2), 11 October 2018, *Hershkovitz 18-01* (holotype [F], isotype [P], Figs. 3-5).

Diagnosis. Plants sharing the morphological and molecular genetic characteristics of species of *Cistanthe* sect. *Cistanthe* (sensu Hershkovitz 2006, 2018a) but differing in having the combination of an annual life history and leafless, terete inflorescence culms.

Winter annuals (facultatively short-lived perennials ?), glabrous, caudiciform. **Taproot** fusiform, branched, 7-20 mm broad at the apex, apex truncate. **Caudical rhizome** [= the characteristic vertical subterranean portion of the stem in between the swollen caudex apex and the swollen bases of the rosettes emerging at the soil surface] elongated 1-3 cm, bearing scaly cataphylls, internodes 1-2 mm apart, branch scars sometimes evident at subterranean nodes, usually branched at soil surface, forming 1-5 metameric flowering branches. **Metameric stems** rosetiform at the base, thickened and fleshy, basal internodes not elongated, bearing numerous rosette leaves. **Leaves** simple, succulent, more or less glaucous, narrowly oblanceolate to obovate, up to 10 cm long, leaf base decurrent, broadened and somewhat clasping at the node, apex acute or in northernmost populations rounded. **Inflorescence culms** bulbous and white at the base, with a few unelongated internodes, bearing cataphylls at the nodes, abruptly constricted above the base, stiff, wiry, reddish, terete, internodes elongated, nodes bracteate. **Inflorescence** cymose, ca. 30 cm

long, the developing portion somewhat reflexed, rarely branched, leafless, bracteate, basal nodes sterile, 1-bracteate, flowering nodes 8-10, bracts 2, markedly unequal. **Bracts** up to ca. 10 mm long, amplexicaul, ovate, apex acute, becoming papery with age, densely striate with black resinous lines. **Pedicels** elongate, erect in flower, in fruit sharply angled basally, up to 4 cm long in fruit. **Flowers** perfect, autogamous, facultatively cleistogamous. **Sepals** 2, 10-15 mm long, ovate, acute, densely striated with black resinous lines, persistent, enveloping the fruit. **Petals** 5, free, imbricate, flabellate, 2-4 cm long, rose to fuchsia, darker reddish towards the claw, spreading at anthesis, twisting about the ovary after pollination, deciduous. **Stamens** free, ca. 50 in ca. 3 whorls, 12-15 mm long, filaments subulate, pale to white at the base, rose above, margins papillate basally, anthers 1.5 mm long, dorsifixed, purple, pollen yellow. **Pistil** epigynous, syncarpellate, shorter than to as long as the stamens. **Ovary** greenish, ovate, ca. 3 mm long, 3-loculate, placentation axile. **Ovules** ca. 100. **Style** single, 1.5-6 mm long, white. **Stigma** globular, ca. 2x style width, 3-parted, lobed, crests undulating, forming sulcate invaginations, yellowish, papillate, style and stigma withering after anthesis. **Fruit** a valvate capsule, 8-12 mm long, dehiscent basipetally. **Seeds** subglobose, ca. 0.6 mm, micropyle hooked, strophiolate, black, densely covered with short hairs.

Distribution and habitats. *Cistanthe philhershkovitziana* has been observed in Regions IV, V, and Metropolitana of Chile (Fig. 1B). In Region IV, it occurs only during intermittent rainy El Niño years on the coastal plain semidesert steppe of Elqui and Limarí Provinces in between the Panamerican Highway and the coast. A single individual was observed in 1999 along the Panamerican Highway near Los Vilos, Choapa Province. This occurrence may have been anthropogenic, as I never found another individual in this vicinity in subsequent years. In Region V, it has been observed on backdune vegetation at Zapallar and Pichicuy, Petorca Province. In Region Metropolitana, I observed a small population in a sclerophyllous woodland opening near Tiltil, Chacabuco Province, near the border with Petorca Province.

Geographic variability. Dimensions of the plants are developmentally plastic and somewhat different among the three geographical forms: the backdune beach form (B) of the type locality and Zapallar (Villagrán et al. 2007) in Petorca Province, Region V of Chile; the coastal range sclerophyllous woodland clearing (CR) form collected in Chacabuco Province, Region Metropolitana; and the coastal plain semidesert steppe (CP) form of Limarí and Elqui Provinces Region V. Presumably, the CR form also occurs in openings of coast range sclerophyllous woodland of Petorca Province.

B plants have rather more succulent leaves and caudices than CR and CP forms, and the leaves are more glaucous. The root is 1-2 cm broad near the apex, and the caudical rhizome about half as broad. CR and CP caudices and caudical rhizomes are more slender.

Assuming adequate moisture, inflorescences achieve a length of ca. 30 cm, more erect in CR and CP forms, somewhat more ascending to prostrate in B forms. Petal length is usually ca. 2-3 cm in B and probably CR forms (few observations) but 3-4 cm in adequately irrigated CP forms. Petal color is more rose in B forms and more red-magenta in CP forms. Leaves of CP forms are more obovate, usually acute at the apex, but sometimes more rounded.

Phenology. Plants of *C. philhershkovitziana* evidently germinate with the arrival of the winter rainy period characteristic of the Mediterranean climate of north-central Chile. The first rains typically arrive in late May to early June, but the timing and amount of rain varies significantly year-to-year. The CP plants appear only during rainy El Niño years. During The flowering period extends from late September in the northern part of the range to mid-October in the southern.

Additional observations. Chile: Region Metropolitana, Chacabuco Province, Highway F10G (Camino a la Cuesta de la Dormida) 2 km e of Puente Santa Laura, roadside in opening of sclerophyllous vegetation, *Hershkovitz 99-977* [voucher destroyed!]. Region IV, Choapa Province, former two-lane Panamerican Highway 3 km n of Los Vilos at junction with Highway D85, solitary individual in median

strip at junction, *Herskovitz 99-945* [voucher destroyed!], no plants found in this vicinity during several searches in subsequent years, hence possibly anthropogenically dispersed from northern Region IV. Elqui Province, Las Tacas, coastal plain along and east of the Autopista de Elqui (Ruta 5, Panamerican Highway) km 443 at Las Tacas interchange, *Herskovitz 00-144* [voucher destroyed!], multiple observations at this locality in rainy but not dry years, 2000-2010. Limarí Province, multiple observations in 2010 along the Autopista de Elqui (Ruta 5, Panamerican Highway), ca. km 350-400, and along Routes D540 and D542 towards the coast and Parque Nacional Fray Jorge. Region V, Petorca Province, La Ligua Municipality, Humedal de Pichicuy, *Herskovitz 03-06* [voucher destroyed!]; Zapallar Municipality [pers. obs., 2004; Villagrán et al. (2007: 181, 216, lámina 71), as *C. grandiflora*], beach area.

DISCUSSION

Diagnosis. *Cistanthe philhershkovitziana* is distinguished easily from other species of *C.* sect. *Cistanthe* by its annual life history and smaller size. Morphologically, it shares no special similarity with any other species in particular. Some other species are similar to *C. philhershkovitziana* in having (mostly) basal leaves and terete culms. These include *C. discolor*, *C. mucronulata* (Meyen) Carolin ex Hershk. (except coastal forms), and *C. aegitalis* (Phil.) Carolin ex Hershk. (Herskovitz 2018a). But each of these species, besides being perennials, differs from *C. philhershkovitziana* in additional traits. *Cistanthe philhershkovitziana* is readily distinguished from its sympatric relatives, *C. grandiflora* and *C. laxiflora*. The latter can behave facultatively as an annual (Herskovitz 2018a). I have seen flowering individuals with strict stems on the order of 20-30 cm high, but normally the plants are much-branched and much larger, as much as two meters high and broad and with dinner plate-sized leaves. But, regardless of size, the definitive diagnostic trait is the triquetrous culm (mentioned by Schlectendal 1831: 74), and also the culms are leafy at the base. *Cistanthe laxiflora* is a succulent leafy shrub (Fig. 2B).

Cistanthe cachinalensis (Phil.) Peralta & D. I. Ford was described as an annual with a slender root (Philippi 1860), so it might be considered as a candidate species for plants here referred to *C. philhershkovitziana*. But I believe that *C. cachinalensis* pertains to the weedy and polymorphic *C. grandiflora*, which can behave as an annual under stressful circumstances. *Cistanthe cachinalensis* was described from a collection from 26.5S, elevation 1700 ft (= ca. 500 m). That locality, known then as “Cachinal de la Costa,” corresponds to mountainous fog desert habitat just south of Parque Nacional Pan de Azúcar, Region II, Antofagasta Province. Philippi (1860) described it as having leafy stems, and this is evident in the type specimen (holotype: *Philippi s. n.* [SGO (photo!)]). Unfortunately, the most critical diagnostic trait, the triquetrous culm, is not discerned easily in herbarium specimens.

Rosas & Estévez (2010) considered *Calandrinia taltalensis* I. M. Johnst. (holotype: *I. M. Johnston 5284* [G (photo!)] as a taxonomic synonym of *C. cachinalensis*. Johnston (1929) described the species as appearing to be biennial, but the type specimen also bears numerous stem leaves. The peculiar trait of the *Calandrinia taltalensis* type is the inflorescence form. Compared to other species of *C.* sect. *Cistanthe*, it is more densely cymose, the cymes are erect and not reflexed, and, as Johnston (1929: 37) noted, the pedicels remain short and erect in fruit, rather than becoming elongated and reflexed. In Herskovitz (2018a), I considered *Calandrinia taltalensis* as a synonym of *Cistanthe cachinalensis*, but I now consider its taxonomic status as unresolved.

A final possible candidate for the annual species is *Calandrinia speciosa* Lehm. (Lehmann 1831: 7, cf. Schlectendal 1831: 74), *non Calandrinia speciosa* Lindley (= *Calandrinia menziesii* (Hook.) Torr. & A. Gray; see Herskovitz 2018a), *non Calandrinia speciosa* Hook. (Hooker 1835, *nom. inval.*, = *Cistanthe laxiflora* (Phil.) Carolin ex Hershk.)). The protolog of *Calandrinia speciosa* Lehm. indicates that the culm is terete, but otherwise is not informative sufficiently to diagnose its identity. There appears to be no other information available that would facilitate its diagnosis.

Life history. *Cistanthe* sect *Cistanthe* has been considered to include only perennial species, whereas most species of *C.* sect. *Rosulatae* (Reiche) Hershk. are annuals. Evidently for this reason, Reiche (1898) classified *C. cachinalensis* in his *Rosulatae* grouping rather than *C.* sect. *Cistanthe* (see Johnston 1929: 147). Molecular data (Herskovitz 2006) demonstrates that, notwithstanding loss of the vouchers, four samples representing all three geographical forms *C. philhershkovitziana* belong to *C.* sect. *Cistanthe*. One sample, *Herskovitz 03-06* (locality data not included in Herskovitz 2006) was from the same Humedal de Pichicuy population as *Herskovitz 18-01*. However, and not insignificantly (see below), existing molecular marker data for *Cistanthe* fail to diagnose species, much less phylogenetic relations between them.

I previously described *C. philhershkovitziana* (as an unnamed species) as annual (Herskovitz 2018a) based on recollections of field observations and collections, 1998-2010. The collections were destroyed in 2016. On 11 October, 2018, I visited the Pichicuy population specifically to recollect the lost *Herskovitz 03-06* collection. I discovered that several individuals showed evidence of perenniality, in particular, branch scars along the caudical rhizome (Fig. 5A, B). Up to three such scars were found, although, because of the sensitivity of the site, I did not excavate more than ten individuals. Flowering individuals were scarce in the 2018 drought season relative to rainy years, and most were stunted. However, some of the largest flowering individuals lacked evidence of prior seasonal growth (Fig. 5C, D).

I am inclined to believe that the subterranean branch scars on the caudical rhizome of some individuals also represent current year growth. Previously, I had visited this site only during rainy years and had not noticed thusly scarred individuals. This might have been luck of the draw. In rainy years, plants are abundant, which is not surprising. An individual bearing four inflorescences, each with ten fruits each yielding 100 seeds, would produce 4000 seeds. Finding only annual growth in collected individuals, I was satisfied that the plants were annual. However, 2018 was a drought year with irregularly distributed rainfall. The few passing frontal systems were separated by a few weeks of unseasonably warm weather. The final system passed through on 18 September, 22 days before my collection.

Thus, I suspect that the seeds germinated in response to early winter precipitation, but the moisture was inadequate to sustain reproductive growth. The branches would have died back to the caudical rhizome and abscised, leaving a scar. Plants lacking such scars germinated following a more recent rain, which was sufficient to sustain reproductive development in both these and previously germinated individuals. This die-back morphology evidently is programmed in perennial *Cistanthe* species, in which massive annual above ground growth, including the basal leaf rosette, dies back to the caudex after flowering. *Cistanthe philhershkovitziana* evidently retains this capacity. But whether the caudex can persist for more than one successful reproductive cycle (i.e., whether individuals can be iteroparous) is not clear. This would need to be established experimentally.

My suspicion is that the caudex itself is not persistent, at least not for very long. Caudex persistence would be favored most is a low backdune locality like that in Humedal de Pichicuy, ca. 100 m from the shoreline, where favorable temperature and humidity are maintained year-round, even in drought years. The backdune itself is formed and delimited by the Río Guaquén delta and an estuarial extension (Fig. 1A). Thus, the water table remains relatively high. A few massive and evidently very old individuals of *C. laxiflora* occur on the site, and they flower amply even in drought years. Thus, if caudices of *C. philhershkovitziana* indeed persisted several years, one would expect to find larger plants and expect these to be the most conspicuous individuals during a drought year like 2018 (as is the case for *C. laxiflora*!). In fact, the population was rather sparse this year, and most individuals were stunted and formed few flowers. Among the few larger plants was one lacking caudical rhizome branch scars (Fig. 3A, B, Fig. 5C).

I believe that the vestigial perenniality of the B plants is specific to this habitat. I doubt that the CR and CP plants manifest this trait. I no longer possess the specimens to evaluate the caudex of my CR and CP collections. These populations would not have germinated in the drought of 2018. My recollection is that these plants unearthed easily and showed no evidence of perenniality. The CP populations evidently emerge only in El Niño years, when rainfall is sufficient to provoke the “desierto florido” phenomenon in the Atacama Desert further north. One population flowers abundantly in rainy years along the Panamerican Highway at Las Tacas (Region IV, Elqui Province). During one drought season, I thoroughly searched at least two hectares of this locality, digging into the sandy soil, looking for evidence of these plants. I found none.

Among *C.* sect. *Cistanthe*, *C. philhershkovitziana* tentatively is the only species that is fundamentally annual. As noted, *C. grandiflora* may be facultatively annual. But another species meriting investigation is *C. tovarii* Galán de Mera of Tacna Province, Peru (Galán de Mera 1995). This species bears similarities with *C. paniculata* (Ruíz and Pavon) DC, but clearly is distinct in having glabrous seeds and rather reduced flowers. Although described as a perennial, presumably this was based on its thickened root and not based on multiple field observations or experimental evidence. While the illustration manifests a thickened root, it does not appear to be thicker than that of *C. philhershkovitziana*. Given the relatively small size of the plant and the exceptionally reduced flower size, there seems to be a possibility that *C. tovarii* is annual.

Presumably, the annual life history of is derived within *C.* sect. *Cistanthe*, but there are caveats (HersHKovitz 2018b, c): **(1)** as noted above, existing molecular marker data do not diagnose, much less resolve relations among species of the section; **(2)** in *C.* sect. *Rosulatae*, the annual life history is ancestral and perenniality is derived at least twice; **(3)** among other Cistantheae, perenniality is derived in Calyptridinae and (effectively) in *Lenzia*; perenniality presumably is ancestral in *Montiopsis*, but with caveats and, in any case, the high divergence of this genus may render moot its relevance in evaluating ancestral states in other Cistantheae; **(4)** the diverging clades adjacent to Cistantheae are the transcordilleran Phemerantheae and Australian *Rumic astrum* Ulbrich; the former include only perennials, the latter are ancestrally annual (Hancock et al. 2018).

Ecology and conservation. *Cistanthe philhershkovitziana* is restricted to open, well-drained sandy soils of backdunes, semidesert coastal plain steppe, and open areas of coastal range woodland. Evidently, it is scarce in the latter vegetation. The most extensive populations spread for many hectares in the coastal plain of southern Elqui and Limarí Provinces. At present, no anthropogenic activity threatens these populations, especially as the plants are robust, autogamous, and highly fecund. But a significant change in precipitation amount, whether more or less, might alter the vegetation and thus indirectly affect the CP range of *C. philhershkovitziana*.

The backdune population at Humedal de Pichicuy is threatened by anthropogenic activity. The small backdune (Figs. 1A, 2.) itself harbors a sparse vegetation of few but almost entirely native species, including those of the genera *Alstroemeria*, *Chorizanthe*, *Leucheria*, *Oenothera*, *Schizanthus*, *Schizopetalon*, and *Tweedia*. Integrity of the backdune substrate is maintained by rhizomes of certain taxa, e.g., *Alstroemeria*. The surrounding denser vegetation, in contrast, is dominated by invasive exotic species. The foredunes are dominated by the exotic *Ambrosia chamissonis* (Less.) Greene. The peculiar conditions of the backdune evidently preserve the native vegetation and resist invasion.

But the backdune vegetation at Pichicuy (and presumably Zapallar) is fragile. The state of the Pichicuy locale is extremely precarious in the face of human encroachment. It is located about 200 m from the escarpment of the Panamerican Highway, 185 km n of Santiago. Prior to 2000, much of this route was two-lane and less traveled. Because of truck traffic and steep grades, travel time to Santiago,

especially during vacation periods, was four or more hours. Pichicuy and other smaller beach villages were visited relatively rarely.

With completion of the superhighway in 2001, travel time to Santiago reduced to less than two hours. This, along with dramatic increases in urban population, vehicle ownership, and relative affluence has created demand for permanent and touristic housing and supporting commerce along the coast in Region IV and northern Region V. Today, large housing developments are under construction along the Panamerican Highway immediately opposite the Huaquén-Pichicuy coast, as evident in Fig. 1A. Massive increase in beach access is expected.

During a visit in 2010, I found that the Pichicuy backdune had been severely damaged by motorcycles. Since that time, the Municipality of La Ligua in collaboration with others has taken measures to preserve the Humedal de Pichicuy. Today, the area is posted and guarded. However, massive increase in beach access still threatens the backdune, as it presents an inviting landscape for beach blankets and sand shovels. Hopefully, 24-hour guarding will protect the backdune during the vacation season. Otherwise, unfortunately, conservation may require fencing.

However, more realistically, it must be appreciated that, at a millennial scale, the current Humedal de Pichicuy geography is transitory. Natural processes are bound to modify the coastline and the Río Guaquén delta and estuary. A major tidal wave in this seismically active zone is not inconceivable, and the entire site could be obliterated in seconds. Whether anthropogenic or not, climate change and/or flow reduction or contamination of the Río Guaquén and/or a rising in sea level will eliminate the existing estuarial system and the backdune vegetation.

Whether or not anthropogenic effects present localized and direct threats to the dune/estuary ecosystem, anthropogenic effects at the regional scale likely do. In particular, regional alteration of the coastline undermines the capacity of the natural coastline to mitigate the impact of long-term geographic and climatic changes. Over time, dunes and estuaries and their biota naturally “migrate” and evolve in response to changing conditions. However, highly urbanized coastlines cannot accommodate such natural transformations. From Fig. 1A, it should be evident that the dune/estuary system at Pichicuy, only some tens of meters broad, is constrained on all sides and has no margin for natural movement.

Etymology. *Cistanthe philhershkovitziana* is named as a tribute to my late father, noted zoologist Philip Hershkovitz (1909-1997). This might seem peculiar, given that P. Hershkovitz was not a botanist and never visited Chile. Despite the latter, one of only 17 Chilean endemic mammal species, *Akodon herskovitzi* Patterson, Gallardo & Freas, 1984, is named in his honor. The discovery and description of *Cistanthe philhershkovitziana* owes no less to his legacy.

In 1998, I was recruited to finance and develop a plant molecular systematics research program in Chile, and I moved there in January, 2000. Despite the considerable personal economic cost and professional inconvenience, Philip Hershkovitz had instilled in me philanthropic convictions, and I believed that “giving back” to South America was a noble and philanthropic way to both extend his legacy and expend his largesse. I was a naïve liberal progressive. Long story short, by 2016, I found myself homeless on the streets of Santiago.

Among the very few possessions I have retained is a gift from P. Hershkovitz, a personalized copy of his 1977 Living New World Monkeys tome (Hershkovitz 1977), a fraction of his lifetime work (Langguth 1997, Mittermeier 1997, Patterson 1997). As an adolescent, I also labored countless hours on this effort. Now, with a critical eye, I appreciate its unequaled scholarly qualities. But no living beneficiary of the work of P. Hershkovitz can appreciate more than I the history of poverty, persecution, sacrifice, valor, and tragedy on which it was wrought. For example, P. Hershkovitz (1977) cites

specimens he collected in Ecuador, 1933-1937, where he moved because the Great Depression in the US left him unemployed, broke, and unable to pay his undergraduate tuition. He travelled alone in the jungle, hunting his own food, and constructing his own lodgings. So sown was the seed of his monumental achievement.

But even considering the comparatively comfortable labor conditions of the Field Museum in the 1950s-1960s, it may be difficult for modern researchers to conceptualize how P. Hershkovitz' bibliography could have been generated without the benefit of modern digital—in some cases even electric—gadgetry. As was the norm in taxonomy in those days, P. Hershkovitz' work, including much of his 1977 tome, was drafted and corrected entirely in pencil and, before 1970, typed on a manual typewriter with two carbon copies. All (analog) photography, illustration, plate arrangement, and labeling (one of my principal tasks) were done manually. Likewise, modern researchers may not be able to conceptualize how such a bibliography was generated without the cumulative career assistance of the current norm of scores to hundreds of coauthors.

Reflecting on this, I appreciated that my current conditions, however difficult, must be considered comparatively privileged and posh compared to the Ecuadorian jungle in the 1930s. My father's literary incarnation thus motivated my renewed efforts to write manuscripts and, in particular, describe this particular species, which I recollected on the eve of P. Hershkovitz' 109th birthday. Two of P. Hershkovitz' works were all I had to weight the makeshift plant press. It would be a travesty for me to name the species in any other manner. Appropriately, the holotype has been deposited in the herbarium of the Field Museum in Chicago, where P. Hershkovitz labored, 1947-1997.

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Fig. 1. Locality data for *Cistanthe philhershkovitziana*. **A.** Satellite view of the type locality, a portion of Humedal de Pichicuy. A portion of the older section of the community of Pichicuy is at the upper left. A portion of a new housing development under construction is visible in the upper right, separated by the Panamerican Highway (Ruta 5). **1.** The mouth and delta of the Río Guaquén. This is the border between the Municipalities of La Ligua and Papudo (light blue line). **2.** Lateral estuary of the Río Guaquén. **3.** Backdune. Plants of *Cistanthe philhershkovitziana* are restricted to this oblong areas (lighter in color), especially the southeastern portion near the rock outcrop (darker spot). **B.** Map of north-central Chile showing collection/observation localities of *Cistanthe philhershkovitziana* (see text) in Regions IV, V, and Metropolitana (MET). **1.** Type collection locality, Pichicuy. **2-7.** Previously collected localities (vouchers destroyed). **2.** Las Tacas. **3.** Between the Panamerican Highway and Parque Nacional Fray Jorge. **4.** Along the shoulder of the Autopista de Elqui (Ruta 5, Panamerican Highway), ca. km 350. **5.** North of Los Vilos along the prior Panamerican Highway. **6.** Beach in the vicinity of Zapallar. **7.** Chacabuco Province.



Fig. 2. Humedal de Pichicuy backdune habitat of *Cistanthe philhershkovitziana*. **A.** View eastward towards rock outcrop. **B.** View westward away from rock outcrop towards estuary, beach, and the village of Pichicuy. The succulent shrub in the foreground is a modest-sized individual *Cistanthe laxiflora*.

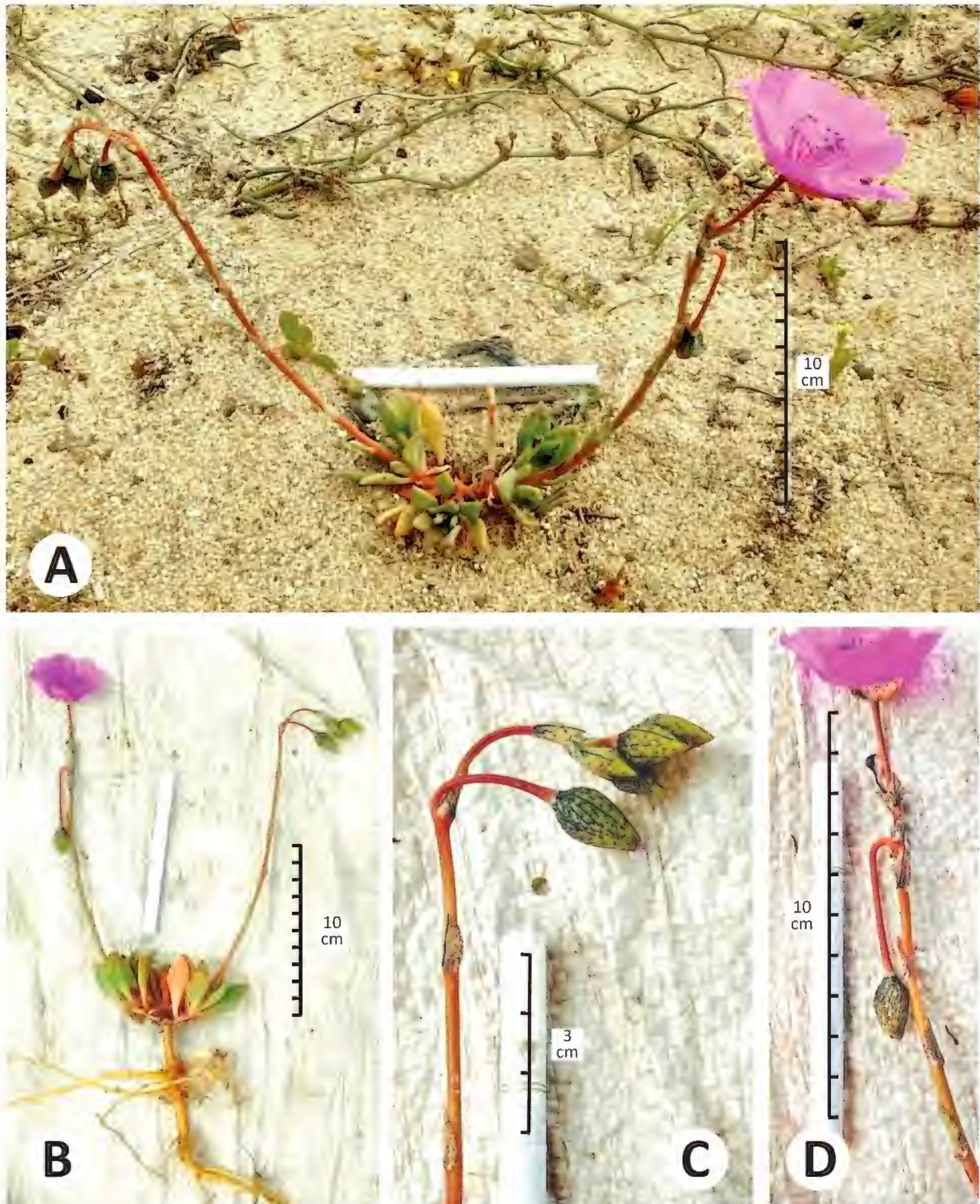


Fig. 3. *Cistanthe philhershkovitziana*. Hershkovitz 01-18. **A.** Naturally occurring plant. **B.** Whole plant excavated. **C.** Developing portion of inflorescence. **D.** Reflected pedicel after anthesis.

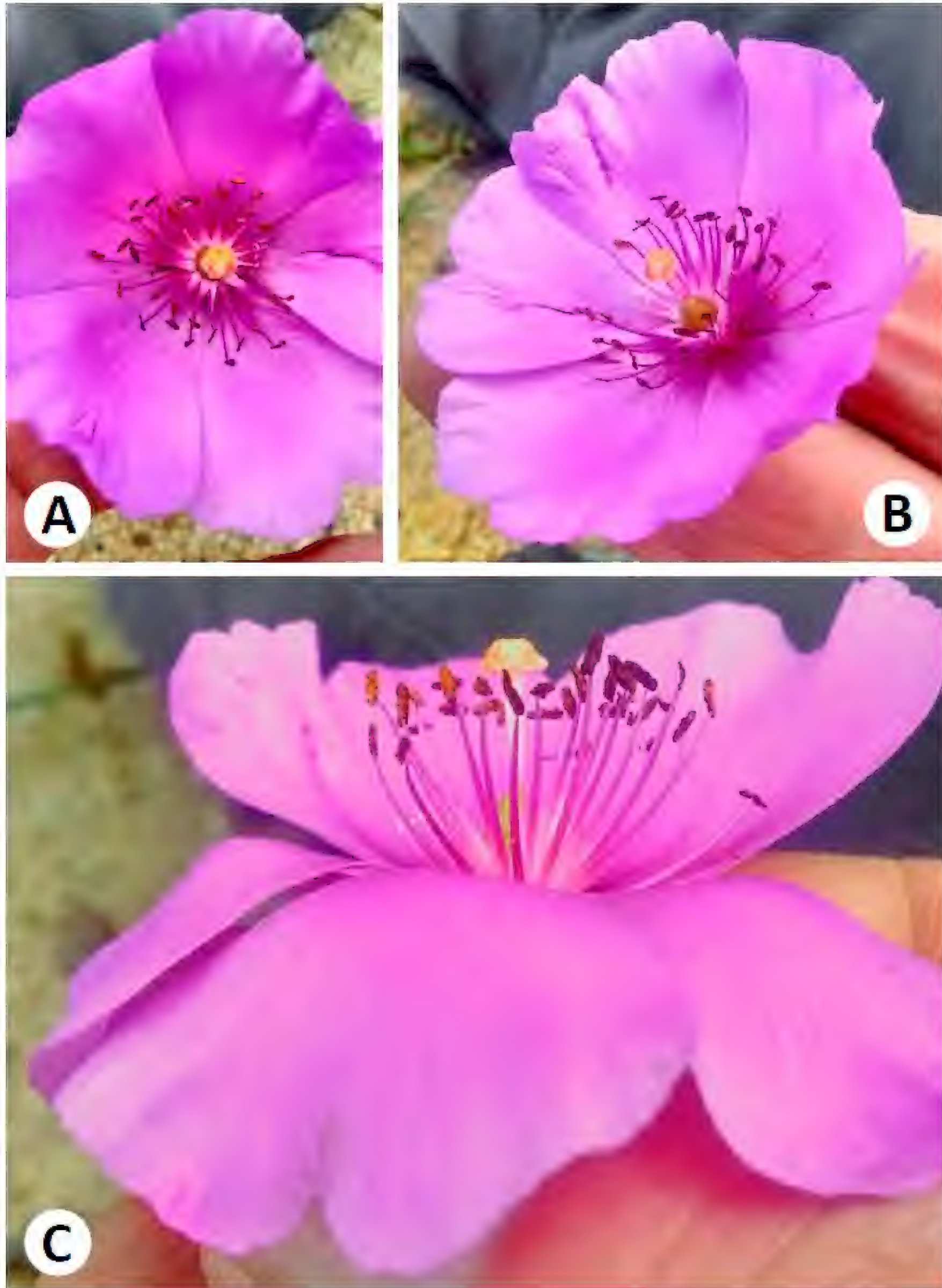


Fig. 4. Flower of *Cistanthe philhershkovitziana*. Hershkovitz 01-18. **A.** Radial view. **B.** Oblique view. **C.** Lateral view.

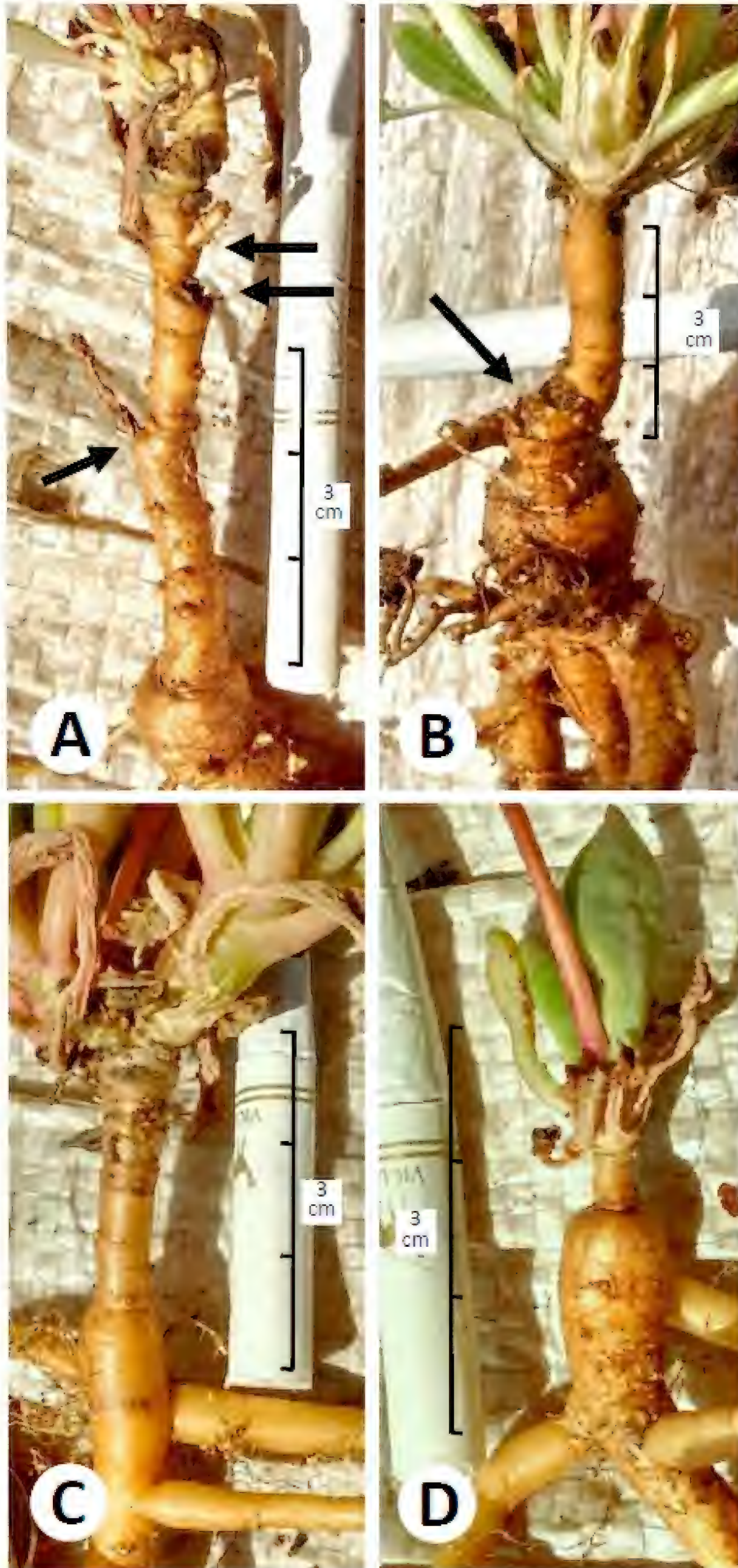


Fig. 5. Caudices of *Cistanthe philhershkovitziana*. **A.** Caudex with three branch scars (arrows) along the caudical rhizome, below the extant leafy rosette. **B.** Caudical rhizome with a subterranean central branch scar (arrow) and lateral subterranean branch supporting the extant leafy rosette. **C.** Close-up of the caudex apex and caudical rhizome of the flowering specimen in Figure 1, lacking caudical rhizome branch scars. **D.** Additional flowering specimen lacking caudical rhizome branch scars.